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**M013d: ONE ROPE BRIDGE**

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<b>TSP Number/Title</b>	M013d: One Rope Bridge
<b>Effective Date</b>	Implement next class iteration upon receipt
<b>Supersedes TSP(s)/Lessons</b>	None
<b>TSP User</b>	The following courses use this TSP: Summer Instructor Qualification Course (MIQC) Basic Military Mountaineering Course (BMC) Assault Climbers' Course (ACC)
<b>Proponent</b>	United States Army Alaska, Northern Warfare Training Center
<b>Improvement Comments</b>	Send comments and recommendations on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to:  ATTN: TRAINING ADMINISTRATOR COMMANDANT USARAK NWTC 1060 GAFFNEY ROAD #9900 FORT WAINWRIGHT AK 99703-9900
<b>Security Clearance/Access</b>	Public domain
<b>Foreign Disclosure Restrictions</b>	The Lesson Developer in coordination with the USARAK NWTC foreign disclosure authority has reviewed this lesson. This lesson is releasable to foreign military students from all requesting foreign countries with Approval of Commandant USARAK NWTC.

**Purpose**

This training support package provides the instructor with a standardized lesson plan for presenting instruction for:

Task Number	Task Title
VIII.0804	One Rope Bridge

**Technique of Delivery**

Lesson Number	Instructional Strategy	Media
M013d	Class and Practical Exercise	None

**This TSP contains**

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**SECTION I****ADMINISTRATIVE DATA****All courses  
including this  
lesson**

Course Number	Course Title
NA	Mountain Instructor Qualification Course
NA	Basic Mountaineer Course
NA	Assault Climber Course

**Task(s) Taught or  
Supported**

Task Number	Task Title
VIII.0300.21	Tie a transport knot
VIII.0804.01	Install a one rope bridge across an obstacle with a transport knot tie-off
VIII.0804.02	Install a one rope bridge across an obstacle with the alternate tensionless anchor knot tie-off
VIII.0804.03	Prepare personnel/equipment for movement on a one rope bridge
VIII.0804.04	Cross an obstacle on a one rope bridge
VIII.0804.05	Recover a one rope bridge

**Task(s)  
Reinforced**

Task Number	Task Title
VI.0200	Risk Management for Mountain Operations
VIII.0200	Mountaineering Equipment
VIII.0300	Rope management and knots
VIII.0700.03	Construct an improvised seat harness
VIII.0400	Anchors

**Test Lesson  
Number**

Hours	Lesson Number	Lesson Title
	M020	BMC Mountaineering Review

**Prerequisite  
Lesson(s)**

- M005, Risk Management for Mountain Operations  
-M008, Rope Management and Knots, VIII.0300.03, VIII.0300.04 VIII.0300.06, VIII.0300.10, VIII.0300.11, VIII.0300.18, VIII.0300.21, VIII.0300.22  
-M009, Anchors, VIII.0400.01, VIII.0400.02  
- M012, Roped Climbing VIII.0700.03

**References**

Number	Title	Date	Additional Information
FM 3-97.6	Mountain Operations	NOV 00	
FM 3-97.61	Military Mountaineering	AUG 02	
NA	USARAK NWTC Mountain Operations Manual	FY 2003	
NA	Risk Management for Mountain Operations	FY 2003	

**Student Study  
Assignment**

Read TSP M013d

**Instructor  
Requirements**

MIQC graduate, TAITC graduate

**Additional  
Support  
Personnel  
Requirements**

Minimum 3 instructors for the demonstration

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**Equipment  
Required****Instructor Equipment:**

- Mountaineering helmet
- 1 rope static kernmantle 11mm x 50m
- 4 non locking oval steel carabineers
- 1 rope kernmantle 11mm x 16 ft
- 2 pieces of nylon webbing 1" x 9.5 f
- Adequate webbing and padding to sling a natural anchor.
- Rucksack

**Student Equipment:**

- Mountaineering helmet
  - 1 rope static kernmantle 11mm x 50m
  - 4 non locking oval steel carabineers
  - 1 rope kernmantle 11mm x 16 ft
  - 2 pieces of nylon webbing 1" x 9.5 f
  - Adequate webbing and padding to sling a natural anchor.
  - Rucksack
  - Pen and notepad
- 

**Materials  
Required****Instructor Materials:**

- NWTC Mountain Operations Manual
- Risk Management for Mountain Operations

**Student Materials:**

- NWTC Mountain Operations Manual
  - Risk Management for Mountain Operations
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**Classroom,  
Training Area  
and Range  
Requirements**

Mountaineering training/testing area large enough to facilitate 8 students working in a group and SGL. Training area must have a far and near side anchors so the rope installation may be set-up.

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**Ammunition  
Requirements**

None

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**Instructional  
Guidance**

Before presenting this lesson, instructors must thoroughly prepare by studying this lesson and identified reference material.

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**Branch  
Safety  
Manager  
Approval**

NAME	Rank	Position	Date
Mark Gilbertson	GS-09	Training Specialist	

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**Proponent  
Lesson Plan  
Approvals**

NAME	Rank	Position	Date
Peter Smith	GS-12	Training Administrator	

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## M013d: ONE ROPE BRIDGE

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### SECTION II

### INTRODUCTION

Method of instruction: Small Group  
Type of instruction: Class  
Instructor to student ratio: 1:8  
Time of instruction: 2 Hours  
Media used: None

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#### Motivator

The one rope bridge is a tight rope installation used to move personnel and equipment over terrain obstacles such as swift flowing mountain streams and ravines. You will learn to properly install, operate, and retrieve one rope bridges.

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#### Terminal Learning Objective

<b>ACTION:</b>	Install a one-rope bridge; cross a one-rope bridge.
<b>CONDITION:</b>	Given a climbing rope and a rack with adequate hardware and sling material. The installation will be constructed over a swift mountain stream or ravine, etc. The maximum distance the one rope bridge can span is approximately 1/2 to 2/3 of the rope length in use (dynamic rope). Distance may be increased slightly if using static rope. Installation will be performed by a squad/team of no less than 5 personnel and evaluated collectively. Crossing technique will be graded individually. Site selection and anchors will be pre-selected and provided at the test site
<b>STANDARD:</b>	Install a one-rope bridge; cross a one-rope bridge IAW the NWTC Mountain Operations Manual.

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#### Safety Requirements

Ensure that students:

- Receive a risk assessment prior to movement to the training area and before practical exercises.
  - Have all necessary equipment for the PE's, to include any additional equipment required by the NWTC SOP.
  - Have two full canteens and drink adequate water to avoid becoming dehydrated.
  - Receive a briefing on the symptoms of heat injury or cold weather injury, as appropriate.
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#### Risk Assessment Level

Determined by instructor

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#### Environmental Considerations

None

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#### Evaluation

You will be evaluated on this task during the Mountain Stakes portion of training as per the NWTC training schedule for this course.

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#### Instructional Lead-in

You have already mastered the skills of rope management and knots, natural anchors, fixed rope and many others. You will use a combination of these skills to learn to properly install, move on and recover a one-rope bridge.

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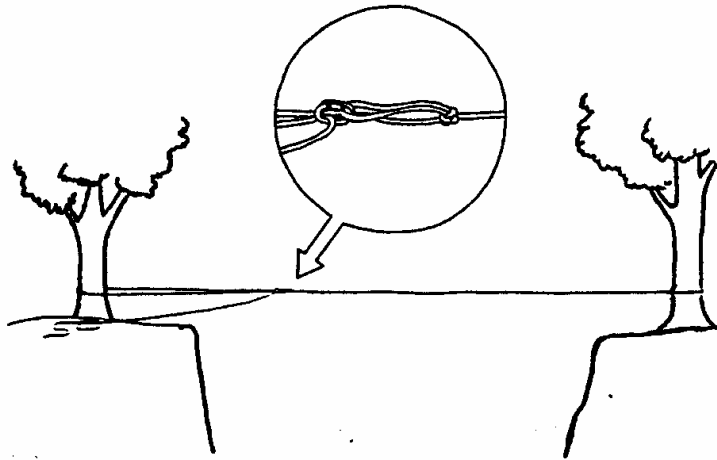
## ELO A

<b>ACTION:</b>	Install a one rope bridge.
<b>CONDITION:</b>	Given a climbing rope and a rack with adequate hardware and sling material. The installation will be constructed over a swift mountain stream or ravine, etc. The maximum distance the one rope bridge can span is approximately 1/2 to 2/3 of the rope length in use (dynamic rope). Distance may be increased slightly if using static rope. Installation will be performed by a squad/team of no less than 5 personnel and evaluated collectively. Crossing technique will be graded individually. Site selection and anchors will be pre-selected and provided at the test site
<b>STANDARD:</b>	Install a one rope bridge IAW the NWTC Mountain Operations Manual.

## Learning Step Activity 1 - Installing a One Rope Bridge

The one rope bridge is a "tight rope" or high load installation used to move personnel and equipment over terrain obstacles such as swift flowing mountain streams, ravines, and other deep gullies. The maximum distance the rope bridge can span is roughly 1/2 to 2/3 of the actual rope length when using a dynamic rope. This means if a 120 ft Army greenline rope is used for the installation, the distance between the near and far anchors must not exceed 80 ft, and may have to be a bit less to get a fairly tight rope.

The crossing site must have suitable "bombproof" anchors on both the near and far banks. Since the rope bridge is a high load installation, these anchors must be extremely strong. Large, healthy trees and solid rock formations are always preferred. For any high load installation, try to find an anchor which common sense tells you is probably stronger than the climbing rope. The site must also have suitable loading and unloading platforms between the anchors and each edge of the obstacle so personnel can safely get on and off the system.



The rope must first be anchored on the far side. If crossing a stream, the swimmer is belayed across as discussed in Chapter 9, "Mountain Stream Crossings". If crossing a ravine, getting across to the far anchor may involve a rappel down and a roped climb up the other side. Proper rope management and/or belay techniques must be used.

Once the swimmer or climber has reached the far side, he selects a suitable anchor and waits.

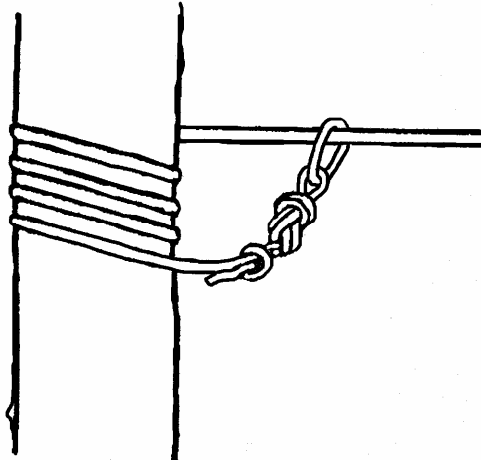
One man on the near side will tie a Wireman's Knot as close to the obstacle as possible and place two carabineers, with gates opposed, into the loop of the Wireman's Knot. At that time, the remainder of the rope should be routed around the near side anchor point and connected to the carabineers. Then

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the far side man will pull the Wireman's Knot out approximately 1/4 the distance from the near anchor for a dynamic rope or 6 to 10 feet for a static rope. This allows room for tightening of the rope. Once this is done, the far anchor man will take up the remaining slack and secure the rope to the anchor point with one of the approved anchor methods.

### Knots and Rope Management

One great way of anchoring the far side of the one rope bridge is with a tensionless anchor knot.



The tensionless anchor knot can be used, be weary of rough surfaces that could abrade the rope.

To tie the tensionless anchor knot use the following steps:

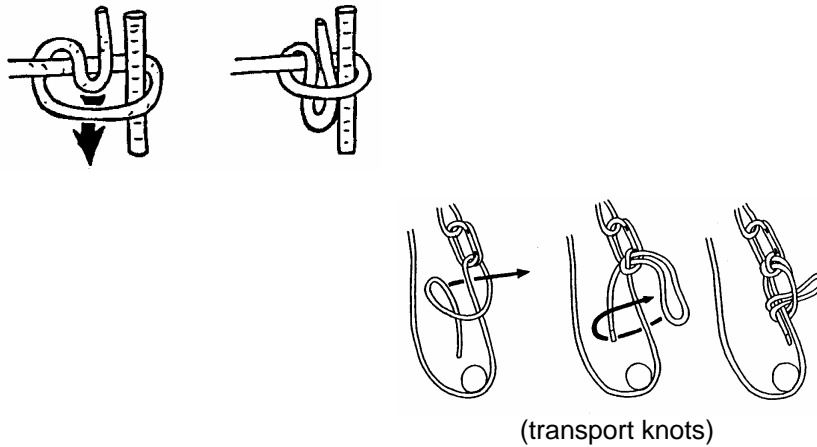
1. The end of the rope is wrapped around the anchor three or more times
2. A figure eight loop is tied in the end of the rope
3. The fixed loop of the figure eight is attached to the standing part of the rope with a carabiner
4. Once the rope is under tension, the wraps should take a significant amount of the load off the figure eight knot making the knot easier to untie. More wraps generally equals less load on the knot. Use a minimum of three wraps.
5. Avoid excess slack between the figure 8 loop and the wraps.

**Note:** The tensionless anchor knot is the preferred method for anchoring ropes in high load installations as this spreads more of the load to more rope length through the wraps. It can be used in place of the round turn & bowline described earlier.

The rope is now ready to be tightened and tied-off on the near side. The rope should only be tightened to a point where enough stretch is taken out to eliminate severe sagging once it is loaded. It is very important not to "over-tighten" the rope.

If all the stretch is taken out of a dynamic rope, strength loss will be "SEVERE" and the chance of the rope breaking will be high. The rope does not have to be "guitar-string" tight. A good rule of thumb is to have no more than 3 personnel tighten the system. Three individuals should be able to take out an adequate amount of rope stretch to make the system effective without severely reducing the strength of the rope.

Once the rope is adequately tightened, the location of the wireman's knot should be close enough to the near anchor so personnel can easily load onto the system in front of the knot. The system is tied-off with a transport knot, secured with a half-hitch on a bight for safety. The bight should hang down and be at least 12 inches long when the knot is completed to eliminate the chance of it working loose. The alternate tie off could be used instead.



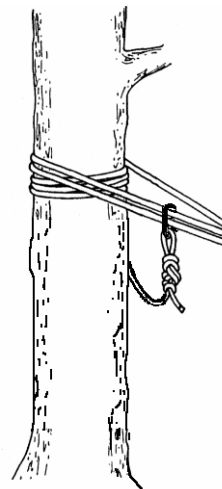
**NOTE:** A second rope may be installed (as in the suspension traverse) under less tension to increase safety. An individual would clip-in to both ropes when crossing, having a back-up in case of failure of the primary rope

**NOTE:** When using the Tensionless anchor, keep rechecking the tightness of the bridge, it will start to loosen after use.

## ELO B

<b>ACTION:</b>	Install a one rope bridge utilizing the alternate tensionless anchor knot.
<b>CONDITION:</b>	Given a climbing rope and a rack with adequate hardware and sling material. The installation will be constructed over a swift mountain stream or ravine, etc. The maximum distance the one rope bridge can span is approximately 1/2 to 2/3 of the rope length in use (dynamic rope). Distance may be increased slightly if using static rope. Installation will be performed by a squad/team of no less than 5 personnel and evaluated collectively. Crossing technique will be graded individually. Site selection and anchors will be pre-selected and provided at the test site
<b>STANDARD:</b>	Install a one rope bridge utilizing the alternate tensionless anchor knot IAW the NWTC Mountain Operations Manual.

### Learning Step Activity 1 - Using the Alternate Tensionless Anchor Knot



**Figure 8.16 Alternate Tie-off: Tensionless Anchor Knot (Near Side Anchor)**

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There is an alternate tie-off method that can be used using a tensionless anchor knot.

The one-rope bridge is installed the same as in VIII.0804.01, however you would replace the transport knot with the tensionless anchor knot. After the bridge has been tightened by 3 people the running end is brought around the anchor in the opposite direction that the rope initially went, working down in the same way as taught in VIII.0804.01 then the carabiner is hooked to the double rope.

NOTE: When using the Tensionless anchor, keep rechecking the tightness of the bridge, it will start to loosen after use.

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**ELO C**

<b>ACTION:</b>	Prepare personnel/equipment for movement on a one rope bridge.
<b>CONDITION:</b>	Given a climbing rope and a rack with adequate hardware and sling material. The installation will be constructed over a swift mountain stream or ravine, etc. The maximum distance the one rope bridge can span is approximately $\frac{1}{2}$ to $\frac{2}{3}$ of the rope length in use (dynamic rope). Distance may be increased slightly if using static rope. Installation will be performed by a squad/team of no less than 5 personnel and evaluated collectively. Crossing technique will be graded individually. Site selection and anchors will be pre-selected and provided at the test site.
<b>STANDARD:</b>	Prepare personnel/equipment for movement on a one rope bridge IAW the NWTC Mountain Operations Manual

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Learning Step Activity 1 - Preparing to Cross the One Rope Bridge

Personnel cross on the one rope bridge wearing a rappel seat or the improvised seat harness. A carabiner is attached to the front of the rappel seat as in rappelling (VIII.0803.05 and VIII.0803.06). The individual faces the rope with the far anchor to his left and clips into the rope. Personnel should always clip-in in this manner so the seat harness carabiner runs with the lay of the rope.

When moving with a rucksack a carrier sling must be utilized, this is accomplished by using a 1" x 9.5 feet tubular nylon webbing, which is tied in to a large loop using a water knot. When this is done adjust the loop so that the knot is down  $\frac{1}{3}$  of the length of the loop. At this point grab the webbing at the top of the knot and tie an overhand knot then do the same below the knot.

Now that you have a carrier sling, take the smaller of the three parts of the sling and girth hitch it around the frame of the rucksack, place a carabiner in the middle part of the sling on the opposite side of the water knot. Now when you get ready to cross the one-rope bridge, snap the carabiner that is on the carrier sling onto the rope bridge then take the large part of the sling and snap it in an oval carabiner that is on a leg loop of the seat harness. Once you are at this point you clip onto the rope and cross with the sling hanging between your legs.

NOTE: The carrier sling ensures that the weight of the rucksack is on the rope and not on the person crossing and that the crosser is just pulling the rucksack.

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**ELO D**

<b>ACTION:</b>	Move on a one rope bridge
<b>CONDITION:</b>	Given a climbing rope and a rack with adequate hardware and sling material. The installation will be constructed over a swift mountain stream or ravine, etc. The maximum distance the one rope bridge can span is approximately $\frac{1}{2}$ to $\frac{2}{3}$ of the rope length in use (dynamic rope). Distance may be increased slightly if using static rope. Installation will be performed by a squad/team of no less than 5 personnel and evaluated collectively. Crossing technique will be graded individually. Site selection and anchors will be pre-selected and provided at the test site
<b>STANDARD:</b>	Move on a one rope bridge IAW the NWTC Mountain Operations Manual.

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### Learning Step Activity 1 - Crossing the One Rope Bridge

To cross the one-rope bridge 1<sup>st</sup> you are inspected by the personal in charge of the loading platform then clip your carrier sling with rucksack on the rope then clip your self on the rope. Progress is made by rotating under the rope, with the head towards the far anchor, and pulling with the hands and arms. Do not place your feet on the rope.

**NOTE:** Start with the far side anchor to your left and exit on the same side.

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**ELO E**

<b>ACTION:</b>	Recover a one rope bridge
<b>CONDITION:</b>	Given a climbing rope and a rack with adequate hardware and sling material. The installation will be constructed over a swift mountain stream or ravine, etc. The maximum distance the one rope bridge can span is approximately 1/2 to 2/3 of the rope length in use (dynamic rope). Distance may be increased slightly if using static rope. Installation will be performed by a squad/team of no less than 5 personnel and evaluated collectively. Crossing technique will be graded individually. Site selection and anchors will be pre-selected and provided at the test site
<b>STANDARD:</b>	Recover a one rope bridge IAW the NWTC Mountain Operations Manual.

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### Learning Step Activity 1 - Recovering a One Rope Bridge

To immediately retrieve the one rope bridge, the system is broken down before the last man crosses. The last man will tie-in or attach himself to the rope properly (stream crossing) and be belayed across the obstacle by a person on the far side. The installation may be left in place and retrieved at a later time.

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**SECTION IV****SUMMARY**

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**Check on Learning**

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**Review and  
Summarize  
Lesson**

<b>ACTION:</b>	Install a one-rope bridge; cross a one-rope bridge.
<b>CONDITION:</b>	Given a climbing rope and a rack with adequate hardware and sling material. The installation will be constructed over a swift mountain stream or ravine, etc. The maximum distance the one rope bridge can span is approximately 1/2 to 2/3 of the rope length in use (dynamic rope). Distance may be increased slightly if using static rope. Installation will be performed by a squad/team of no less than 5 personnel and evaluated collectively. Crossing technique will be graded individually. Site selection and anchors will be pre-selected and provided at the test site
<b>STANDARD:</b>	Install a one-rope bridge; cross a one-rope bridge IAW the NWTC Mountain Operations Manual.

**Transition to next  
lesson**

As per NWTC training schedule; dependent upon the course in conduct.

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**SECTION V****STUDENT EVALUATION**

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**Testing  
Requirements**

**Students will be tested on this task during the Mountain Stakes portion of training as per the NWTC training schedule for this course.**

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**Feedback  
Requirement**

**Students will receive two opportunities to pass each event tested. Re-training will be conducted for students that fail the first iteration of testing. Refer to M020 for specifics.**

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